

Claims

1. A particulate composition comprising particles having a core within a shell, in which the core comprises a hydrophobic polymer, characterised in that the shell comprises a semi-permeable membrane.
2. A composition according to claim 1 in which the hydrophobic polymer contained in the core is capable of absorbing a hydrophobic liquid.
3. A composition according to claim 1 in which the hydrophobic polymer in the core comprises a hydrophobic liquid.
4. A composition according to claim 2 in which the hydrophobic liquid comprises an active substance.
5. A composition according to claim 1 in which the active substance is selected from the group consisting of fragrance oils, lubricant oils, essential oils, wax inhibitors, corrosion inhibitors, colorants, vitamins antioxidants and dye transfer catalysts.
6. A composition according to claim 1 in which the core comprises a hydrophobic polymer formed from a hydrophobic monomer or blend of monomers comprising C₄ to C₃₀ alkyl esters of ethylenically unsaturated carboxylic acid, preferably C₄ to C₃₀ alkyl esters of (meth)acrylic acid.
7. A composition according to claim 1 in which the core comprises at least two different polymeric substances.
8. A composition according to claim 1 in which the shell has been formed by interfacial polycondensation reaction.
9. A composition according to claim 1 in which the average particle diameter is 0.5 to 30 microns.
10. A process for making particles having a core comprising hydrophobic polymer within a shell, by the steps,
 - a) dispersing an aqueous emulsion of hydrophobic polymer into a water immiscible liquid containing an emulsifier to form a reverse phase emulsion comprising of an aqueous dispersed phase which contains the hydrophobic polymer,
 - b) inducing interfacial polycondensation of at least one interfacial

polycondensation reactant to form a polymeric shell around the hydrophobic polymer, to form a dispersion of the particles,

- c) optionally subjecting the dispersion of particles to dehydration to remove any residual water from the particles,

characterised in that the shell comprises a semi-permeable membrane,

11. A process according to claim 10 in which the aqueous emulsion or the water immiscible liquid in step a) contains an active ingredient and in which the water immiscible liquid is absorbed by the hydrophobic polymer, wherein resulting particles contain active ingredient entrapped within the core.

12. A process according to claim 10 in which the shell is formed by interfacial polycondensation reaction of a substantially oil soluble first interfacial polycondensation reactant having at least two first condensation groups with a substantially water soluble second interfacial polycondensation reactant having at least two second condensation groups, the process comprising combining the second interfacial polycondensation reactant with the aqueous emulsion of hydrophobic polymer, prior to conducting step (a) of the process, then blending in the first interfacial polycondensation reactant to induce the interfacial polycondensation reaction of step (b) and allowing reaction to occur between the first and second interfacial polycondensation reactants to form the shell.

13. A process according to claim 10 in which the core comprises a hydrophobic polymer formed from a hydrophobic monomer or blend of monomers, comprising C_4 to C_{30} alkyl esters of ethylenically unsaturated carboxylic acid, preferably C_4 to C_{30} alkyl esters of (meth)acrylic acid.

14. A process according to claim 10 in which the core comprises at least two different polymeric substances.

15. A process according to claim 10 in which the emulsifier is an oil soluble or oil swellable amphipathic polymeric stabiliser.

16. A process according to claim 10 in which the emulsifier is polymeric and comprises recurring hydrophobic groups and recurring reactive hydrophilic groups that associate with the second condensation groups of the second interfacial polycondensation reactant before the blending with the first interfacial polycondensation reactant.

17. A process according to claim 10 in which the blending of the first interfacial polycondensation reactant is conducted by mixing the dispersion and the first interfacial polycondensation reactant under conditions wherein the weight ratio of dispersion to first interfacial polycondensation reactant remains substantially constant through the blending process.
18. A process according to claim 10 in which the water immiscible liquid is a hydrocarbon liquid, substantially free of halogenated hydrocarbon.
19. A process according to claim 10 in which the water-soluble interfacial polycondensation reactant is an amine, the oil soluble interfacial polycondensation reactant is an acid or acid derivative, and the condensation polymer is a polyamide.
20. A process according to claim 10 in which the water-soluble interfacial polycondensation reactant is diethylene triamine.
21. A process according to claim 10 in which the oil soluble interfacial condensation reactant is terephthaloyl chloride.
22. A process according to claim 10 in which the average particle diameter is between 0.5 and 30 microns.
23. A process according to claim 10 in which the emulsifier is polymeric and has pendant carboxylic groups, the second interfacial polycondensation reactant is an amine.
24. A process according to claim 10 in which the emulsifier is a random copolymer formed by copolymerising a mixture of ethylenically unsaturated hydrophilic and ethylenically unsaturated hydrophobic monomers.
25. A process according to claim 10 in which the emulsifier is a random copolymer of at least one ionic ethylenically unsaturated monomer with at least one non-ionic water insoluble ethylenically unsaturated monomer.
26. A process according to claim 25 in which the ionic monomer is selected from acrylic acid, methacrylic acid and maleic acid (or anhydride) and the non-ionic monomer is selected from styrenes and fatty alkyl esters of ethylenically unsaturated carboxylic acid.
27. A process according to claim 10 in which the emulsifier becomes covalently bonded on to the outer surface of the particles.

28. A process according to claim 27 in which the emulsifier comprises reactive groups which are epoxide or hydroxyl and the covalent linkage is an ether, or the reactive groups are amino groups and the covalent linkage is an amide, or the reactive groups are carboxylic free acid or anhydride or acid halide (or salt) and the covalent linkage is an ester or amide.
29. A process according to claim 10 in which the emulsifier is a copolymer of hydrophilic monomer units comprising dicarboxylic anhydride units, and hydrophobic monomer units.
30. A process according to claim 10 in which the emulsifier is an addition polymer of hydrophobic monomer units and hydrophilic monomer units wherein the hydrophobic monomer units comprise carboxylic free acid or acid salt units and reactive monomer units selected from glycidyl monomer units and anhydride monomer units.
31. A process according to claim 10 in which the hydrophobic polymeric core is capable of absorbing a hydrophobic liquid.
32. A stable dispersion of particles uniformly distributed throughout a first hydrophobic liquid, wherein the particles comprise a core within a shell and the core comprises a hydrophobic polymer into has been imbibed a second hydrophobic liquid, characterised in that the shell comprises a semi-permeable membrane.
33. A dispersion according to claim 32 in which the first and second liquids have approximately the same density.
34. A dispersion according to claim 32 in which the particles comprise an active substance.
35. A dispersion according to claim 34 in which the active substance is selected from the group consisting of fragrance oils, lubricant oils, essential oils, wax inhibitors, colourants, corrosion inhibitors, vitamins, printing and imaging actives for carbonless copy paper, industrial adhesives, sealants, fillers, paints, catalysts, blowing agents, solvents, agrochemicals, food and feed actives, pharmaceuticals, antioxidants, dye transfer catalysts and cosmetics.
36. A dispersion according to claim 32 in which the second hydrophobic liquid comprises two or more components and the core contains at least two different

hydrophobic polymers.

37. A dispersion according to claim 32 in which the particles have been formed by a process defined by claim 10.

38. A method of making a stable dispersion of particles that are uniformly distributed throughout a first hydrophobic liquid, comprising the steps of,

- (a) forming a particulate composition comprising particles which have a core that comprises hydrophobic polymer within a shell;
- (b) dispersing the particles into a second hydrophobic liquid, in which the hydrophobic polymer is soluble or swellable and which has approximately the same density as the first hydrophobic liquid;
- (c) allowing sufficient time for the second hydrophobic liquid to be imbibed by the hydrophobic polymer in the core;
- (d) transferring the particles comprising the second hydrophobic liquid formed in step (c) into the first hydrophobic liquid;

characterised in that the shell comprises a semi-permeable membrane.

39. A method according to claim 38 in which the first and second liquids are substantially the same substance.

40. A method of controlling the release of an active substance comprising by placing into a substrate or environment into which the active substance is to be released a particulate composition comprising particles which have a core comprising a hydrophobic polymer within a shell, said hydrophobic core material comprising the active substance, characterised in that the shell comprises a semi-permeable membrane.